

## CHAPTER 5. AIRPORT FACILITY REQUIREMENTS

### a. General

In order for the Deer Valley Airport to meet the future needs of airport users, facilities will be required to serve general aviation aircraft ranging in size from small single-engine aircraft to 60,000 pound business jets. For this reason, it was determined that Runway 7R-25L should be planned to standards for the larger aircraft in the general aviation fleet--aircraft in Design Groups I and II, outlined in FAA Advisory Circular 150/5300-12, Airport Design Standards - Transport Airports. Groups I and II aircraft include those with wingspans of 79 feet or less.

The future demand on the airport is not forecast to be at a level at which both runways would be needed for the larger aircraft. Therefore, Runway 7L-25R will be planned according to standards in Advisory Circular 150/5300-4B, Utility Airports, which meet the needs of aircraft under 12,500 pounds.

### b. Runway Requirements

#### Runway Configuration

The configuration of the runway system should ideally meet two criteria: wind coverage and airfield capacity. Wind coverage is the percentage of time that at least one of the airport's runways can be used without the prevailing winds exceeding the FAA recommended maximum crosswind component of 12 MPH.

An analysis was made of the All-Weather wind rose for the Deer Valley Airport, which was presented in Figure 2-4. The analysis concluded that the coverage of Runways 7L-25R and 7R-25L with a maximum 12 MPH crosswind component is 98.2 percent, which is adequate for total airport wind coverage.

The second desired characteristic of the airfield configuration is that it meets required runway capacity. In Chapter 2, the annual capacity of the airport was calculated to be 627,000 in 1984, decreasing to 520,000 by the year 2005. The two-runway capacity will meet forecast demand through 1997; a third parallel runway cannot be provided because of terrain problems, so that demand above the 1997 level of 520,000 annual operations will have to be met at another airport.

#### Runway Lengths

The existing length of the airport's principal runway, 7R-25L, is 5,300 feet. If the airport is to properly serve business jet aircraft traffic, it is generally recommended by the FAA that it should be adequate for 75 percent of the nation's current business jet fleet operating at 90 percent useful loads. A basic length of 8,100 feet is required to meet this

criterion as calculated using FAA's AC 150/5300-12, assuming an average high temperature during the hottest month (July) of 106°F.<sup>1</sup> Correcting for a 0.47% Effective Runway Gradient, the adjusted runway length requirement would be 8500 feet.

Physical limitations on the airport will prevent the entire 8,500-foot length from being provided. The airport property limits (19th Avenue to the west and 7th Street to the east) will only permit a runway length of about 8200 feet, while maintaining runway safety areas off both runway ends (runway safety areas are described later in this section). The full 8200-foot length could not be used by landing aircraft, since displaced thresholds will be required on one or both runway ends to maintain runway clear zones wholly within airport property. Without displaced thresholds, the runway length would be limited to 7200 feet with clear zones maintained on airport property.

The options for achieving the 8200 foot or 7200 foot lengths will be addressed in Chapter 6.

The existing secondary runway on the airport, 7L-25R, is 3,800 feet in length. In order to meet the needs of all light aircraft (under 12,500 pounds) at 106°F, an ultimate length of 4,500 is required, according to criteria in AC 150/5300-4B. An extension of the runway by 450 feet can be accommodated to the west, in the direction opposite from the highest terrain in the airport vicinity, while keeping the runway and clear zone on airport property. This would provide a length of 4,250 feet. The remaining 250 feet of runway extension could be provided in one of two ways: building on the east end of the runway or the acquisition of additional property to the west, which would allow the full 700-foot extension to be to the west. The 250-foot eastward extension, if accomplished, would retain the runway and clear zone within present airport property, while lowering the typical altitudes of aircraft landing on Runway 25R by only 7-12 feet.

#### Runway Widths

The current width of Runway 7R-25L is 100 feet. This width is recommended for runways serving the existing and forecast business jet and large aircraft mix at Deer Valley. It is recommended that any extensions to this runway be constructed to this 100-foot width standard.

Runway 7L-25R, which serves exclusively light aircraft, is 75 feet in width, which meets FAA standards. All extensions to this runway should be built to a 75-foot width.

#### Runway Strengths

The existing strengths of Deer Valley's runways, as reported in the FAA Airport/Facility Directory (October 1984), are as presented in Table 5-1.

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<sup>1</sup>Information obtained from the National Climatic Center, Asheville, NC.

TABLE 5-1

RUNWAY STRENGTHS  
(pounds)  
DEER VALLEY MUNICIPAL AIRPORT

Runway	Single-Wheel	Dual-Wheel	Dual-Tandem Wheel
7R-25L	40,000	50,000	80,000
7L-25R	20,000	Not Rated	Not Rated

These strengths are adequate for the existing and forecast general aviation aircraft mix at the airport. A schedule of maintenance to preserve these strengths, but not to increase them, should be followed.

Runway Safety Areas and Clearances

The runway safety area includes an area adjacent to the sides and ends of a runway, which under normal conditions is capable of supporting an aircraft without causing structural damage to the aircraft or injury to its occupants. The area enhances the safety of aircraft which undershoot, overrun, or veer off the runway, and it provides greater accessibility for firefighting and rescue equipment during such incidents. For runways serving transport category aircraft, the area should be 500 feet wide (250 feet on each side of the runway centerline) for the length of the runway, with 500-foot-wide by 1,000-foot-long areas located on both ends of the runway. For runways serving light aircraft only, a width of 150 feet is required along the runway length, and a 300-foot-long by 150-foot-wide area at each end.

Runway safety area standards apply to all runways. For existing runways constructed before adoption of the standards, FAA recommends the maximum feasible length of runway safety area be provided without reducing the existing length of the runway.

Runway 7R-25L can be extended to 8,200 feet while retaining 1,000-foot-long safety areas on both ends of the runway. The existing paved overruns on the runway ends would provide an acceptable surface for the safety areas. Along the runway edges, several retention basins fall within the 500-foot-wide safety areas. If feasible, these basins should be relocated to other areas of the airport in the future. This relocation, however, is not required by FAA regulations.

The extension of Runway 7L-25R to 4,500 feet can be accomplished, while still maintaining full length (300 feet) safety areas on both ends of the runway on airport property.

FAA planning criteria recommend Building Restriction Lines (BRLs) located 750 feet from the centerline of runways serving transport aircraft (Runway 7R-25L) and 250 feet from runways serving only light aircraft (Runway 7L-25R). Previous airport planning utilized a 500-foot BRL from

Runway 7R-25L, and there are several buildings within the 750-foot clearance as a result. Because of these circumstances, a 500-foot clearance will be maintained for future planning. However, in all cases FAR Part 77 Imaginary Surfaces will be applied to new buildings to assure that no building would be a hazard to air navigation, as defined by Part 77. For Runway 7L-25R, a 300-foot clearance is currently maintained. In the development of concepts, the desirability to maintain this greater clearance will be investigated.

The 300-foot distance between the centerline of Runway 7R-25L and the centerline of its parallel taxiway is also nonstandard, falling short of the FAA-recommended 400 feet. Due to the extent of facilities already constructed, the 300-foot dimension will be retained. The separation between Runway 7L-25R and its parallel taxiway is 200 feet, which exceeds the FAA standard of 150 feet. All future planning will retain the 200-foot dimension.

### c. Navigational Aids, Lighting and Markings

Airport navigational aids fall into two categories--instrument approach aids and visual aids. The only existing instrument approach aid is an NDB approach to Runway 25L, off the Scottsdale NDB. The ongoing MAG study identifies this approach as a conflict to the NDB approach into the Scottsdale Airport, and recommends decommissioning the Deer Valley approach and replacing it with an approach to Runway 7R instead. Given the existing terrain problems east of the airport, this replacement would be of benefit and would be prudent. With only a 0.3 percent annual incidence of IFR weather conditions in Phoenix, a good non-precision approach (Localizer or VOR using an on-airport TVOR) to Runway 7R would be adequate to provide the airport and future users with reliable all-weather capability. A preliminary investigation into siting of a new approach shows that, given the terrain in the airport vicinity, the aid would be best sited on Runway 7R. The analysis of wind conditions in IFR conditions in Chapter 2 further strengthens this recommendation. It is additionally recommended that the NDB approach to Runway 25L be decommissioned when a new approach from the west is established, and a new approach be established on the east end of the runway using the TVOR (if utilized). No instrument landing aids are recommended for Runway 7L-25R. A detailed FAA study will be required before an approach can be installed on any runway end.

The FAA has tentatively programmed a Microwave Landing System (MLS) for the Deer Valley Airport in 1987. However, specific clearance criteria for the approach have yet to be established. If the criteria follow the existing ILS standards, they would be too restrictive and probably could not be adopted for the airport. This is because of the number of hangars already built which violate ILS standards and because of the need for a 2400-foot long approach light system, which would be difficult to site. If the MLS can be installed using less restrictive criteria, it may provide greater utility than a non-precision approach using a TVOR. For master planning purposes, provisions for a non-precision approach only are being made for Runway 7R.

Runway 7R-25L is currently lit with Medium Intensity Runway Lights (MIRL). These lights would be compatible with any planned non-precision approach established to the runway, and will meet future user needs. Runway 7L-25R is currently not lit, but the 1985-1990 Capital Improvement Program for the airport calls for MIRL to be installed on the runway in 1985. This installation is necessary and will meet future airport needs.

Visual aids currently serving the airport include Runway End Identifier Lights (REIL) on Runways 7R and 25L, and Two-Bar Visual Approach Slope Indicators (VASI-2) on Runways 7R and 25L. The aids will meet the future anticipated needs for Runway 7R-25L. It is recommended that VASI-2 (or another type of visual approach slope device) and REIL installations additionally be provided on Runways 7L and 25R, since both of the runways to be provided with these lighting systems meet FAA criteria.

The existing runway markings on Runway 7R-25L are non-precision approach markings. These markings will be adequate for future runway instrumentation. Runway 7L-25R is marked as a visual runway at present. These markings are adequate for future use of this runway.

#### d. Taxiway Requirements

Three aspects of taxiway requirements are addressed--the adequacy of the taxiway system, the physical width of taxiways, and taxiway clearances.

The existing taxiway system was evaluated with regard to operational efficiency. The overall system generally serves the airport well, providing good ground traffic flows. A principal exception is the exit taxiway system serving Runway 7L-25R. Except for the taxiway serving the runway ends, there is only one exit taxiway between the runway and its parallel taxiway, that at the runway's midpoint. In order to reduce the runway occupancy times of aircraft landings on the runway, it is recommended that additional taxiways (two at a minimum) be provided between the runway midpoint and the east and west ends of the runway. These taxiways would improve existing hourly airport capacity by 18 operations (from 276 to 294).

Additionally, when a final airport development concept is selected the parallel taxiways to both runways should be extended to the new runway ends, with holding aprons constructed adjacent to the runway ends. In addition, new taxiways should be provided between the north parallel taxiway and ramp areas to improve overall operational efficiency. These new taxiways will be described in the Airport Layout Plan, Chapter 6.

The minimum taxiway width to meet FAA standards is 35 feet for all taxiways on the airport. Most of the airport taxiways are constructed to a 40-foot width, while others are slightly wider. It is recommended that all future taxiways be constructed to the 40-foot width currently utilized, with 10-foot-wide paved shoulders.

FAA standards for transport airports serving Groups I and II aircraft require that a 64-foot clearance be maintained between the centerline of taxiways and fixed or moveable objects. These standards are not violated

in any area of the airport at present. For future planning, this clearance requirement (in addition to the runway BRL) will be maintained on all taxiways.

e. Hangar Requirements

T-Hangars and Executive Hangars

As of November 1984 there were 232 T-hangars and four executive hangars on the airport. An additional 67 T-hangars will be constructed in early 1985, providing a total of 303 T-hangar and executive hangar units. This number of hangars will accommodate 48 percent of the airport's based aircraft. Assuming that half of the existing 235 waitlist for T-hangars is a true measure of demand, the overall airport demand for T-hangars is 65 percent of total based aircraft. This compares to about 50 percent in other areas of the country with less extreme summer temperatures.

Applying the 65 percent factor to forecast based aircraft, the requirements for T-hangars/executive hangars were determined to be:

	<u>T-Hangar Requirements</u>		
	<u>1990</u>	<u>1995</u>	<u>2005</u>
Forecast T-hangar Demand	488	619	676
Existing (1985) Facilities	<u>303</u>	<u>303</u>	<u>303</u>
Net Requirement (Units)	185	316	373

Conventional (FBO) Hangars

Conventional hangar areas on the airport (excluding the police facility, which does not serve the public) total approximately 64,000 square feet, of which about 51,000 square feet is hangar floor area. Interviews with airport tenants indicate an additional need for 25,000 square feet of space for maintenance purposes which, if provided, would put the total area at 89,000 square feet. With 657 based aircraft (1984) on the airport, a conventional hangar space factor of 140 square feet per based aircraft would exist if the additional hangar areas were provided, while a factor of 100 square feet per aircraft can be derived without the additional areas. The average of these, 120 square feet per based aircraft is used as a planning factor.

The actual need for additional hangar space is contingent upon future airport development patterns. If new areas around the airport are opened up for development, additional hangar space should be provided to support based aircraft in these areas. If the current ratios of available space (and needed space) to based aircraft are good indicators of future demand for conventional hangar space, then the following additional facilities will be required through the study period:

Conventional (FBO) Hangar Requirements

	<u>1990</u>	<u>1995</u>	<u>2005</u>
Forecast Demand (SF) <sup>(1)</sup>	90,000	114,000	125,000
Existing Space (SF)	<u>64,000</u>	<u>64,000</u>	<u>64,000</u>
Net Requirements (SF)	26,000	50,000	61,000

(1) Factor of 120 square feet per based aircraft.

f. Covered Tie-Down Requirements

Planned 1985 construction of 181 additional covered tie-down spaces on the airport will bring the total number of available spaces to 244, or 39 percent of total based aircraft. Without the addition, only 10 percent of all based aircraft are under covered tie-downs. After discussing these factors with local aircraft operators, and balancing the need for this type of facility against future available T-hangars, it was determined that 20 percent of total based aircraft under covered tie downs would be an appropriate planning factor for forecasting facility needs. Applying this factor to forecast based aircraft yields the following future needs:

Covered Tie-Down Requirements

	<u>1990</u>	<u>1995</u>	<u>2005</u>
Demand for Covered Tie-Downs	150	190	208
Existing (1985) Facilities	<u>244</u>	<u>244</u>	<u>244</u>
Net Requirement (Units)	0	0	0

g. Aircraft Apron and Tie-Down Requirements

There are presently 726 open tie-downs on the airport, occupying approximately 319,000 square yards of apron area (excluding taxilanes). Sixty-two of the tie-downs are used for transient aircraft, and 270 will be taken out of use in 1985 to accommodate construction of covered tie-downs (two covered tie-downs take the space of three open tie-downs).

Future requirements are estimated separately for based aircraft space and for transient aircraft parking, since each of these components is sited differently with respect to other facilities. For based aircraft, with 85 percent ultimately provided with T-hangars, executive hangars, or covered tie-downs, 15 percent should be provided with apron space.

Transient parking requirements are forecast based on the expected level of typical busy-hour transient activity. The resulting apron requirements are as follows:

#### Tie-Down Requirements

	<u>1990</u>	<u>1995</u>	<u>2005</u>
Forecast Demand-Based Aircraft Tie-Downs	112	143	156
Required Transient Aircraft Tie-Downs	48	58	58
Existing Spaces (1985)	456	456	456
Net Requirement (Spaces)	<u>0</u>	<u>0</u>	<u>0</u>

While the figures show that the overall number of tie-down spaces are adequate, future development of the airport may require the provision of additional spaces convenient to new hangar facilities.

#### h. Terminal Space Requirements

General aviation terminal space consists of specific areas set aside in FBO hangars and space provided in the separate terminal building to accommodate pilots, passengers and visitors using the airport. These areas include lounges, classrooms, restrooms and pilot briefing areas. The demand for this space is a function of itinerant busy-hour operations, ranging from 70 to 80 square feet per operation, depending on the total number of operations. While a small percentage of local operations generate use of some of the terminal services, the local operations busy-hour does not normally coincide with the itinerant busy-hour. Therefore, the demand on these facilities during the itinerant busy-hour provides a useful index of demand.

The existing terminal building at Deer Valley includes about 12,000 SF of space; in addition, areas of FBO facilities serving pilots and visitors account for approximately another 3,000 SF. The future requirements for space are as follows:

#### Terminal Space Requirements

	<u>1990</u>	<u>1995</u>	<u>2005</u>
Forecast Demand for Terminal Space (SF)	6,840	8,300	8,300
Existing (1984)	15,000	15,000	15,000
Net Requirement (SF)	<u>0</u>	<u>0</u>	<u>0</u>

Additional space, while not required overall, should be provided in newly constructed hangars to make the use of these new facilities as efficient as possible.

#### i. Ground Access and Auto Parking Requirements

The existing ground access to facilities along the southern edge of the airport, as described in Chapter 2, will be adequate for future airport activity. New facilities, wherever developed, will require additional ground access. The new route(s) will be addressed in the Airport Plans portion of the Master Plan.



Automobile parking spaces serving existing airport facilities currently number 770. Requirements for future years were estimated based on a HNTB planning factor incorporating forecast annual operations and peak hour operations. The resultant requirements are as follows:

Automobile Parking Requirements

	<u>1990</u>	<u>1995</u>	<u>2005</u>
Required Parking Spaces	434	580	600
Existing Parking Spaces	<u>770</u>	<u>770</u>	<u>770</u>
Net Requirement	0	0	0

Additional parking will be planned to conveniently serve future airport facilities, even though there may not be a net airport need.

j. Fuel Storage Requirements

The 120,000 gallon fuel storage capacity of the airport, which is described in Chapter 2, provides 80,000 gallons of AVGAS and 40,000 gallons of JET-A. Between 1979-1983, an average of 1980 gallons of AVGAS and 730 gallons of JET-A were pumped daily, which would translate into a 45 day supply of fuel currently available. During the 1970-1983 time period, an airport average of 8.5 gallons were pumped per aircraft departure .

By the year 2000, the increased use of corporate aircraft and reduced level of touch-and-go operations at the airport should increase the average fuel pumped per departure from 8.5 gallons to about 12 gallons. With 712 average day departures expected by 2000, daily fuel flows would be on the order of 8,500 gallons. The existing capacity of 120,000 gallons would therefore provide a 14-day supply.

It is anticipated that as additional FBO facilities are constructed on the airport, new fueling facilities will be provided at some of them. Therefore, a supply well in excess of 14 days will be available on the airport. This supply would be sufficient to meet total airport fuel storage needs. Even without additional facilities, the 14 day supply would be adequate for future needs.

k. Other Facility Requirements

Of particular concern to the City of Phoenix is airport maintenance facilities.

The existing maintenance facility is in poor condition and in need of replacement. Tentative plans were to rebuild it in a new location north of Runway 7L-25R, on the western edge of the airport. Given the likelihood of acquisition of land north of the east end of Runway 7L-25R for expanded airport facilities, it appears that a site in this general area might be more practicable. Upon selection of a final airport development concept in Chapter 6, a recommended site(s) will be identified and described.

# 1. Summary of Airport Facility Requirements

Table 5-2 presents a summary of the principal new facilities needed on the airport to serve aviation demands through 2005.

TABLE 5-2

## SUMMARY OF FACILITY REQUIREMENTS DEER VALLEY MUNICIPAL AIRPORT

Additional Facility	By 1990	By 1995	By 2005
Runway 7R-25L extension	2,900 feet	2,900 feet	2,900 feet
Runway 7L-25R extension	700 feet	700 feet	700 feet
Runway 7L-25R exit taxiways *	2	2	2
Non-precision approach	1	1	1
T-hangars/Executive hangars	185 units	316 units	373 units
FBO hangar space	26,000 SF	50,000 SF	61,000 SF
* Minimum requirements.			